

Changqiao Li

Curriculum Vitae

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Personal information

First name Changqiao
Last name Li
Date of birth 04th November 1989
Nationality Chinese

Current and Previous Positions

Jan 2019 - present **Postdoctoral Researcher**, USTC, Hefei (China).

Education

Jun 2015 - **Co-tutorship Ph.D. in Particle Physics**, “Modern Physics PhD School”, University of Science and Technology of China (USTC), Hefei (China),
Nov 2018 “École Doctorale STEP’UP, Sciences de la Terre et Physique de l’Univers”, Sorbonne Universités, Paris (France). Supervisors: Prof. Y. Liu and Dr. G. Marchiori.
Thesis: “*B-tagging Calibration and Observation of Higgs Boson Decays to a pair of bottom quarks with the ATLAS Detector*”, CERN-THESIS-2018-301. Referees: Prof. A. Rizzi, Dr. L. Vacavant.
Jury Members: Dr. G. Bernardi, Dr. A. Le Bihan, Prof. Y. Liu, Dr. G. Marchiori, Prof. Z. Zhao.

Jun 2012 - **Master in Physics**, USTC, Hefei (China).
Jun 2015

Sept 2008 - **Bachelor in Physics**, USTC, Hefei (China).
Jun 2012 Final dissertation in High Energy Particle Physics titled “*Search for $Z' \rightarrow ee$ on ATLAS*”.

Sept 2005 - **High School Diploma**, No.1 Middle School of Zhengzhou, Zhengzhou (China).
Jun 2008 Main subjects: Chinese Literature, Physics, Mathematics, Chemistry, English.

Schools

Aug 2017 **2017 Fermilab-CERN Hadron Collider Physics Summer Symposium**, CERN, Geneva (Switzerland).

Grants and Awards

Sept 2018 National Excellent Graduate Award
Sept 2016 - China Scholarship Council (CSC) scholarships
Sept 2018
Nov 2015 USTC International Exchange Grant Scheme for Excellent Students and Scholarship Scheme for Overseas Students
Sept 2008 USTC scholarship for newly undergraduate students
Sept 2007 The 24th Chinese Physics Olympiad, 8th place in Henan province

Talks at conferences and workshops

International

Feb 2018 *Evidence for the Higgs $\rightarrow b\bar{b}$ decay with the ATLAS detector*, La Thuile 2018, La Thuile, Aosta Valley (Italy).

National

Mar 2017 *Search for the $H \rightarrow b\bar{b}$ in the VH production channel: Fitting and Results (ICHEP-2016)*, Physique Atlas France, Vogüé (France).

Dec 2016 *B-tagging calibration with Tag-and-Probe Method*, Journées de Rencontre des Jeunes Chercheurs 2016, Les Jardins de l'Anjou (France).

Posters

Feb 2017 *ATLAS b-tagging efficiency measurements using a $t\bar{t}$ sample in pp collisions at $\sqrt{s}=13$ TeV*, 129th LHCC, CERN, Geneva (Switzerland).

Most relevant ATLAS internal presentations

197 presentations in ATLAS meetings (link to indico contribution list)

Nov 2018 *Measurements of simplified fiducial cross sections for the associated production of a weak gauge boson and a Higgs boson decaying to $b\bar{b}$ using $\sqrt{s} = 13$ TeV pp -collisions collected by the ATLAS detector*, Paper Approval Meeting.

Jun 2017 *$VH(bb)$ Unblinded Result - MVA*, Unblinded results approval - $H \rightarrow b\bar{b}$ group meeting.

Papers and Publications

Co-author of 254 papers as ATLAS qualified author.

(INSPIRE record: <http://inspirehep.net/search?p=exactauthor%3AChangqiao&sf=earliestdate>)

Major contributions in

2018 [1] ATLAS Collaboration. Observation of $H \rightarrow b\bar{b}$ decays and VH production with the ATLAS detector. *Phys. Lett. B*, 786:59, 2018

2017 [2] ATLAS Collaboration. Evidence for the $H \rightarrow b\bar{b}$ decay with the ATLAS detector. *JHEP*, 12:024, 2017

2018 [3] ATLAS Collaboration. Measurements of b-jet tagging efficiency with the ATLAS detector using $t\bar{t}$ events at $\sqrt{s} = 13$ TeV. *JHEP*, 08:089, 2018

Public ATLAS Note

2018 [4] ATLAS Collaboration. Evaluation of theoretical uncertainties for simplified template cross section measurements of V -associated production of the Higgs boson. (ATL-PHYS-PUB-2018-035), Nov 2018

2018 [5] ATLAS Collaboration. Projections for measurements of Higgs boson cross sections, branching ratios, coupling parameters and mass with the ATLAS detector at the HL-LHC. (ATL-PHYS-PUB-2018-054), Dec 2018

Conference ATLAS Note

2018 [6] ATLAS Collaboration. Measurements of VH , $H \rightarrow b\bar{b}$ production as a function of the vector boson transverse momentum in 13 TeV pp collisions with the ATLAS detector. (ATLAS-CONF-2018-053), Nov 2018

2018 [7] ATLAS Collaboration. Observation of $H \rightarrow b\bar{b}$ decays and VH production with the ATLAS detector. (ATLAS-CONF-2018-036), Jul 2018

2018 [8] ATLAS Collaboration. Combined measurements of Higgs boson production and decay using up to 80 fb^{-1} of proton-proton collision data at $\sqrt{s} = 13$ TeV collected with the ATLAS experiment. (ATLAS-CONF-2018-031), Jul 2018

- 2017 [9] ATLAS Collaboration. Evidence for the $H \rightarrow b\bar{b}$ decay with the ATLAS detector. (ATLAS-CONF-2017-041), Jul 2017
- 2016 [10] ATLAS Collaboration. Search for the Standard Model Higgs boson produced in association with a vector boson and decaying to a $b\bar{b}$ pair in pp collisions at 13 TeV using the ATLAS detector. (ATLAS-CONF-2016-091), Aug 2016

Research experiences

Analysis

- 2016-2018 **Observation of Higgs Boson Decays to a pair of bottom quarks with the ATLAS Detector** I have performed searches of VH production, where H is the 125 GeV Higgs boson, decaying to b anti-b quark pairs, and $V=W,Z$, with 13 TeV pp collisions recorded by ATLAS [2, 9, 10]. Performing the same analysis on a larger dataset, amounting to 80 fb^{-1} of 13 TeV pp collisions, led to isolate an excess of events with respect to the Standard Model background expectations that has an observed significance of 4.9 standard deviations. In combination with other Hbb searches, this provided the first observation of $H \rightarrow b\bar{b}$ decay [1,7]. I have used the same 80 fb^{-1} dataset to measure the differential VH, $H \rightarrow b\bar{b}$ cross section as a function of the p_T of the vector boson [4, 6]. The measured cross sections are in good agreement with the Standard Model Higgs boson predictions, and limits on anomalous VH couplings have been set. These results have been combined with those of other Higgs boson cross section measurements, either in different production modes or in decays to different final states [8].
- 2018 **Perspective studies for Higgs Boson cross section measurements at the high-luminosity LHC** With the high-luminosity (HL) phase of the LHC, which will start in 2026, ATLAS will collect 3000-4000 fb^{-1} of 14 TeV pp collisions. This sample will allow for much more precise measurements of the Higgs boson properties than the present ones. I have performed, in preparation of inputs for the update of the European particle physics strategy that will take place in 2019, extrapolations of the results of the ATLAS VH, $H \rightarrow b\bar{b}$ cross section measurement to estimate the expected sensitivity to the WH and (qq, gg \rightarrow) ZH cross sections at the HL-LHC [5]. Measurements of the VH production cross sections times the branching ratio of $H \rightarrow b\bar{b}$ with 10-12% accuracy can be performed (for the qq-initiated processes) with an analysis similar to the current one; further refinements of the analysis to exploit the larger sample and introduce more event categories with better signal-to-background ratio or less affected by systematic uncertainties could further improve the precision of such measurements.

Performance

- 2016-2017 **Calibration of the algorithm of b-jet identification of the ATLAS experiment** I have measured the b-jet identification efficiency of the tagging algorithms used by the ATLAS experiment, using 36 fb^{-1} of 13 TeV pp collisions [3]. The efficiency has been measured as a function of the jet transverse momentum (p_T), pseudorapidity (η), and of the average number of pile-up collisions (μ). The efficiencies measured in data have been compared to those predicted from the simulation, and simulation-to-data efficiency scale factors have been determined, that can then be used to correct the simulation of physics processes with identified b-jets in the final state. The efficiency scale factors are close to unity, with total uncertainty ranging between 2% and 12%, with typical values of 3% per b-jet in the p_T range most relevant for the VH, Hbb cross section measurement.